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(56) Documents cited

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(58) Field of search
A5T
F2P
Selected US specifications from IPC sub-class A61M

(54) Catheter mount assembly

(57) A catheter mount comprising an endotracheal tube 10 for passing down a patient's trachea, a catheter mount assembly 11, a Y-piece 12 interconnecting the catheter mount assembly and a first tube 13 connected to an air or oxygen supply and a second tube 14 connected to exhaust, the catheter mount assembly being formed of a flexible tube 17 of a type having a plurality of pairs 18, 19 of facing interlinked frusto-conical surfaces of generally rigid structure, the frusto-conical surfaces of each pair and adjacent frusto-conical surfaces of successive pairs being connected to each other by hinge portions 21, 23, the frusto-conical surfaces and hinge portions being such that the tube flexes from one stable shape to another.

Fig.1.

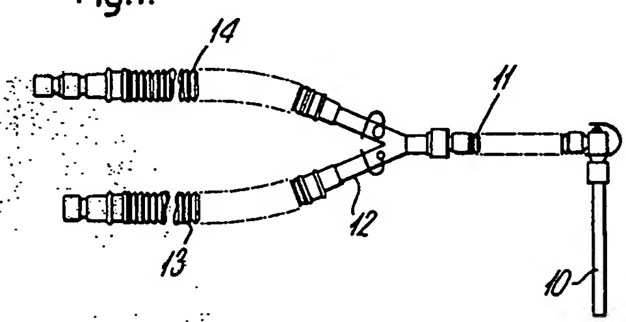
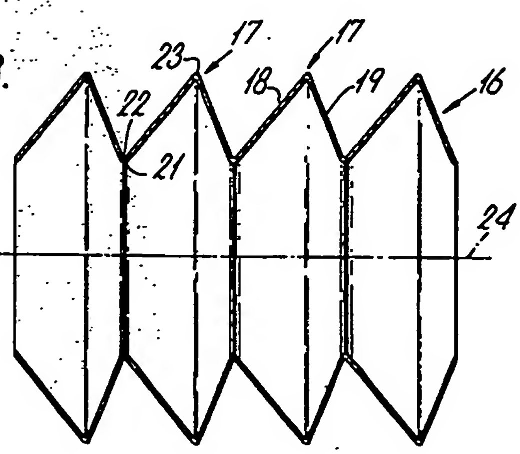


Fig.3.



The drawings originally filed were informal and the print here reproduced is taken from a later filed formal copy.

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Fig.1.

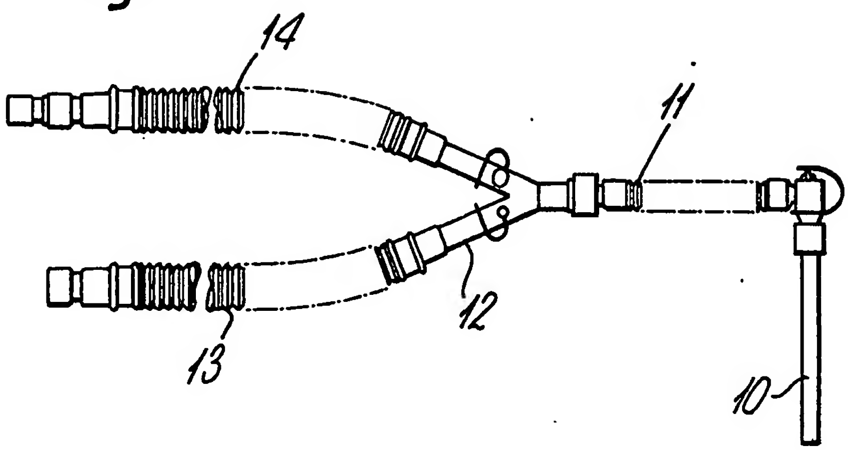


Fig.2.

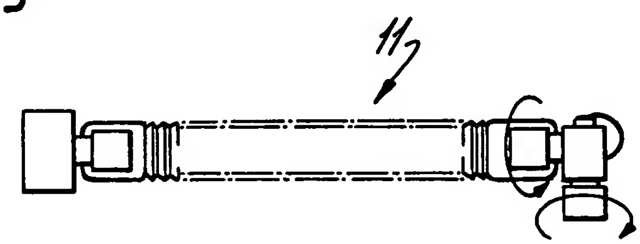


Fig. 3.

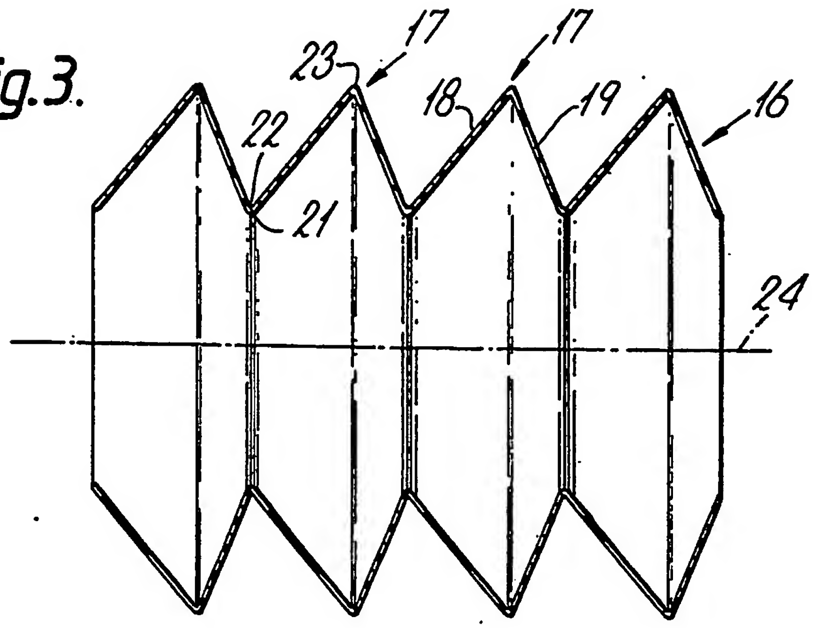


Fig. 4.

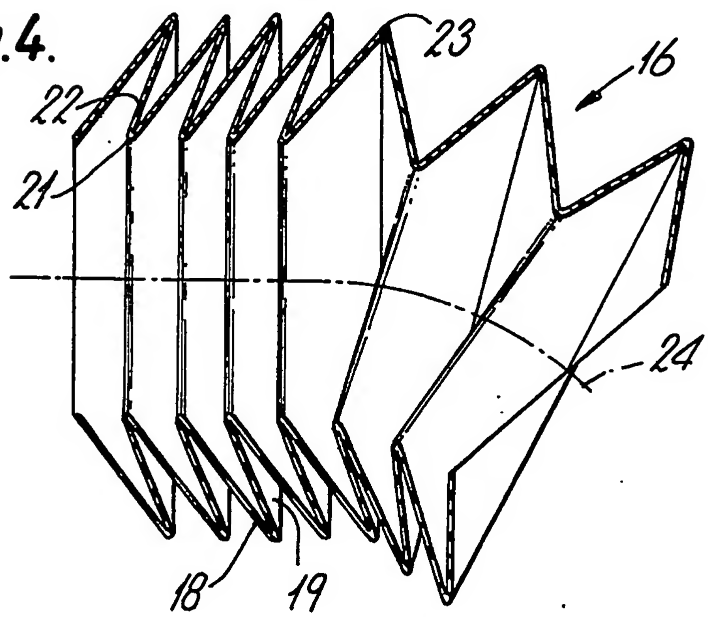


Fig. 5.

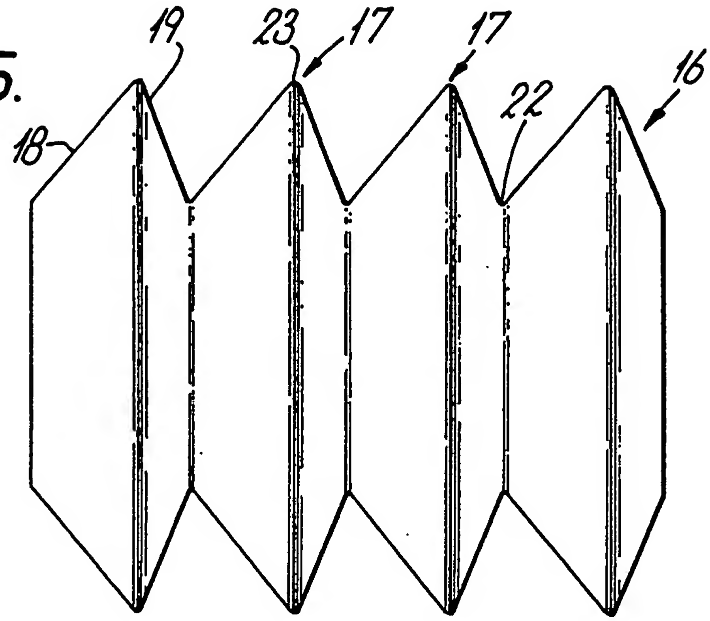
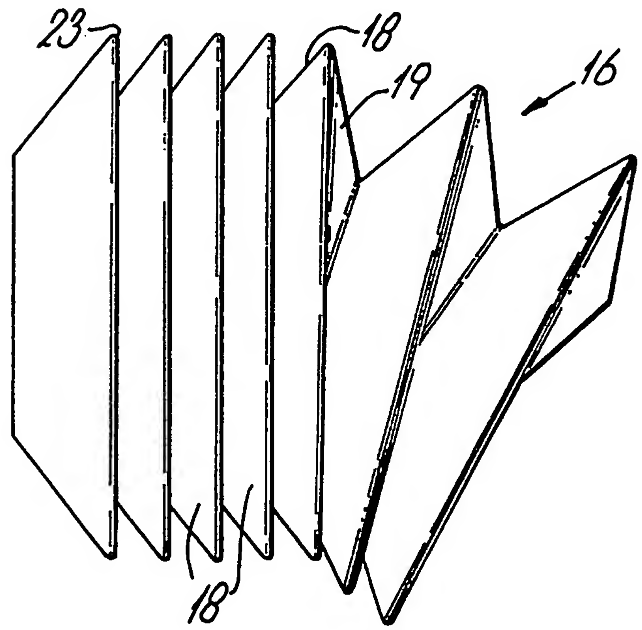


Fig. 6.



SPECIFICATION

Catheter mount assembly

The present invention relates to catheter mounts.

Particularly in intensive care units, forced ventilation of a patient is required. This is normally carried out by passing an endotracheal tube down into the patient's trachea and connecting this endotracheal tube via a catheter mount to a Y-piece, one arm of the Y-piece being connected to a source of air and oxygen under pressure and the other being connected to exhaust.

Figure 1 of the accompanying drawings shows a typical arrangement. In Figure 1 there is provided an endotracheal tube 10, a catheter mount assembly 11, a Y-piece 12, a first tube 13 connected to an air and oxygen supply and a second tube 14 connected to exhaust.

From Figure 1 it is clear that air passes through the catheter mount assembly 11 and the catheter 10 in both directions during forced ventilation and this volume is called a "dead volume" and should be kept to the minimum possible. Clearly the amount of "dead volume" permissible will depend on the size of the patient and particular problems arise when ventilating a child or neonatal patient.

In practice, the Y-piece 12 is supported near the patient's head, the catheter mount assembly 11 is flexible and allows the endotracheal tube 10 to pass directly down to the trachea. Thus the catheter mount assembly 11 must be sufficiently flexible to minimise discomfort to the patient or, if the patient is unconscious as is usual, to prevent damage to the parts of the skin on the patient which come into contact with the endotracheal tube due to circuit weight causing drag on this tube, at such times should the patient move or be moved for nursing purposes. To assist in this flexibility the catheter mount normally includes swivel joints at each end.

Normally the catheter mount assembly includes a flexible tube 16 which is of a moulded rubber or plastics material the flexible tube having a section shown in Figure 2 and as the tube bends then substantially all of the wall of the tube flexes. Furthermore, it requires a substantial force to keep the tube bent.

The present invention provides an improved catheter mount in which the tubular portion includes pleated bellows.

A catheter mount assembly comprising an endotracheal tube, a catheter mount assembly, a Y-piece, a first tube connected to an air and/or oxygen supply and a second tube connected to exhaust, characterised in that the catheter mount assembly includes a flexible tube, the flexible tube being of a type having a plurality of frusto-conical surfaces of generally rigid structure, the frusto-conical surfaces of each pair and adjacent frusto-conical surfaces of successive pairs being connected to one another by hinge portions, frusto-conical surfaces and hinge portions being such that the tube flexes from one stable form to another.

Thus in place of the flexible tube which has hitherto been used in which the majority if not all of the tube wall flexes in order to allow the tube to bend, we provide a flexible tube of the type having a plurality of pairs of facing interlinked frusto-conical surfaces of generally rigid structure (the pleats), the frusto-conical surfaces of each pair and adjacent frusto-conical surfaces of successive pairs being connected to one another by hinge portions. When the tube expands or contracts the frusto-conical portions tend not to flex, except perhaps to move from one stable position to another, the movement being carried out by hinge portions connecting the generally frusto-conical surfaces.

Preferred examples of catheter mount assemblies according to the invention will now be described by way of example only with reference to the accompanying drawings in which:

Figure 3 is a longitudinal section of a typical flexible tube for use in the invention in the expanded position,

Figure 4 is a longitudinal section of the same tube as Figure 3 but contracted and bent, and

Figures 5 and 6 are side views of the tubes corresponding to Figures 3 and 4.

Referring to Figures 3 to 6, Figure 3 shows a longitudinal section of part of the flexible tube 16 when expanded. As will be understood, the tube 16 comprises pairs 17 of frusto-conical surface sections 18, 19, the minimum diameter 21 of both sections 18 and 19 being the same. Thus successive pairs 17 may be connected to one another by circular joints 22. The material used for the tube is a thermoplastic which is a relatively stiff material and which provides natural hinges such as polypropylene. Thus the sections 18, 19 of each pair 17 are relatively stiff and are corrected by circular joints 23, the joints 22, 23 forming natural hinges. In practice the tube 16 may be moulded in a moulding operation moulded to the shape shown in Figure 3 or alternatively may be manufactured in the form of a tube of constant diameter and then formed into the shape shown in Figure 3.

It will be noted that the two surface sections 18, 19 are at a different conical angle A, B, respectively to the axis 24 of the tube. The axial lengths of each section 18, 19 of each pair 17 are different.

It will be understood that each pair 17 of sections 18, 19 have two stable positions, that is when the two sections 18, 19 extend away from one another and a second stable stage illustrated to the left in Figure 4 in which the two sections 18, 19 are folded within one another. Positions between these two extremes are relatively unstable. Thus as is illustrated in the left hand side of Figure 4 the length of the tube 16 is variable between great extremes and can be adjusted so as to reduce the "dead space" provided by the tube 16. It will be understood, of course, that not all of the pairs 17 need to be collapsed or expanded but some can be collapsed and some can be expanded so as to provide a length of tube 16 which is variable over wide limits.

Bending the tube is illustrated to the right in Figures 4 and 6. In this situation, at one point of the circumference of a particular pair 17 of sections 18, 19, the sections 18, 19 are folded away from one another and at the diametrically opposite point of

the circumference of the pair 17 the two sections 18, 19 are folded into one another. This requires a certain amount of flexing of the sections 18, 19. However, such a situation is also stable and it will be understood that it is then very simple to provide a bend of any required degree of turn by flexing more or less of the pairs 17 of the tube 16 and also the bend can be provided at any required position along the length of the tube 16.

The relative axial lengths of the two sections 18 and 19 may be chosen during manufacture but surface section 19 should have an axial length shorter than surface section 18.

The material and dimensions of the tube 16 may be chosen to suit the particular circumstances. With regard to the thickness of the material of the tube, this may be chosen so that little physical force is required to compress or expand each pair 17 of bellows and to reduce optimum level of stiffness to reduce compliance associated with flexible tubing made of typical elastomeric material.

CLAIMS

1. A catheter mount assembly comprising an endotracheal tube (10), a catheter mount assembly (11), a Y-piece (12), a first tube (13) connected to an air and/or oxygen supply, and a second tube (14) to be connected to exhaust, characterised in that the catheter mount assembly includes a flexible tube, the flexible tube being of a type having a plurality of frusto-conical surfaces (18, 19) of generally rigid structure, the frusto-conical surfaces (18, 19) of each pair and adjacent frusto-conical surfaces of successive pairs being connected to one another by hinge portions (22, 23), frusto-conical surfaces and hinge portions being such that the tube flexes from one stable form to another.

2. A catheter mount as claimed in claim 1, characterised in that the flexible tube is made of polypropylene.

3. A catheter mount as claimed in claim 1 or claim 2 characterised in that the two surface sections (18, 19) are of different axial length.

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